Development and Implementation of a Process for Establishing Chesapeake Bay Program's Monitoring Program Priorities and Objectives

Results of the Monitoring Review Workshops, held May through December 2008

Prepared jointly by representatives of the Chesapeake Bay Program Science and Technical Advisory Committee and the Chesapeake Bay Program Watershed Partners Senior Managers

Executive Summary

The process developed by the Scientific Technical Advisory Committee (STAC), Chesapeake Bay Program (CBP) representatives, and the CBP Watershed Partners Senior Managers provides a framework and method for establishing the priorities and objectives of the monitoring program, as requested by the CBP. It meets the larger mission specified by external reviews by the General Accountability Office (GAO) and the Office of Management and Budget (OMB) by providing a repeatable, defensible, and collaborative process. The outcome of this process can be used to re-align, if necessary, the monitoring program with the objectives of the CBP partnership. This process does not make, or endorse, specific recommendations for monitoring program re-design.

Introduction

The Chesapeake Bay Program has long stewarded one of the most comprehensive and long term monitoring efforts in the world. Historically, there have been a multitude of objectives for this monitoring program, as embodied within the numerous Bay Program agreements and action plans over the last 25 years. While the monitoring effort has served many of these objectives very well, its evolution has sometimes been reactive, spread across many fronts, and without clear prioritization and/or reassessment. In a program such as the CBP (a large-scale restoration program, with set goals, practicing adaptive management) a monitoring program must, at a minimum, provide the type of information necessary to assess partner progress towards the goals it has set for itself, and improve decision-making in the Bay watershed (adaptive management). To assess how well the monitoring program was meeting these needs, we asked a simple question: if you were to infer the objectives of the monitoring program from its contents, would they mirror the objectives of the Chesapeake Action Plan? Or would the picture be different? CBP and STAC began a collaborative effort to answer that question. Both agreed that, in a time of tightening resources and as attainment of the restoration goals become ever more urgent, a comprehensive review of the monitoring program was appropriate.

Previous surveys and reviews of monitoring activities, many of them performed under STAC sponsorship, provided evidence of a recurring theme that monitoring for management-related purposes is most useful when specific management endpoints are identified and the geographic/spatial scales of the necessary information to support these decisions is clear (a list of previous reviews is provided in Appendix A). These reviews provided valuable insight into specific portions of the monitoring effort (e.g., shallow water monitoring, watershed indicators, model review), but they did not give clear guidance to the necessary tradeoffs required of any comprehensive monitoring program as that of the Bay. In other words, no monitoring program can be all things, to all people.

STAC's intent was to provide the following: 1) a process to identify the priority management endpoints in current goal attainment and decision-making in the Bay watershed, 2) a process to re-examine, and if necessary re-align, the information needed to support decision-making regarding these management endpoints and the information currently provided by the monitoring program, and 3) establish a process for the necessary disinvesting and reinvesting that must take place, and that can be repeated at appropriate intervals.

Methodology

The review was conducted through a series of three workshops, detailed in the Process Document (Appendix B). Workshop One convened Watershed Partners Senior Managers to define the range of management endpoints involved in decision-making, and to prioritize those endpoints. Watershed Partners Senior Managers include representatives of Signatories to the Chesapeake Bay Agreement, Headwater State Partners, and principal Federal Agency Partners. Workshop Two brought together monitoring program managers and participants to report on the findings of the first workshop and to identify the monitoring program elements available to address the priority management endpoints. Workshop Three re-convened the Watershed Partners Senior Managers to present the consequences and tradeoffs inherent in the prioritization of monitoring program elements, and to confirm the focused message that was developed in Workshop One. In this manner, a consensus-based and focused series of questions emerges, to which monitoring data is critical for the formulation of a response. In this way, the priority endpoints/questions provide a mission statement for the monitoring program. The following discussion presents this mission statement, and provides details on various stages of its formulation.

Identification of Management Endpoints and Prioritization

Workshop One produced an exhaustive listing of all possible management endpoints under each of the first five goals of the Chesapeake Action Plan (Goal 6 was considered outside of the scope of the STAC review):
Goal 1: Protect and Restore Fisheries
Goal 2: Protect and Restore Vital Aquatic Habitats
Goal 3: Protect and Restore Water Quality
Goal 4: Maintain Healthy Watersheds
Goal 5: Foster Chesapeake Stewardship
Goal 6: Enhance Partnering, Leadership and Management
This was a critical documentation effort, illustrating the enormous range of potential endpoints, and thus monitoring elements, that could be assessed. What obviously emerged was that no monitoring program could address all of them, at least not in a fashion that did all things well. The first major statement of the review emerged: **continuing operation of the monitoring effort in a status quo condition is unacceptable**.

Focusing and prioritization necessarily followed, and the consensus-based answer was simple: **the delisting of the tidal segments of the Bay and determining the effectiveness of our management actions are the responsibilities of the partnership,**

and should be the priorities of the monitoring program. It is important to note that this statement integrates both an identification of the priority management endpoints, and a recognition that these management endpoints are a shared responsibility of the partnership (i.e., the responsibility to meet these goals is not the responsibility of any one state).

Clearly, this prioritization is focused on Goal 3: Protect and Restore Water Quality. This singular focus prompted the statement of three associated corollaries: 1) Conditions in the Bay, in terms of the delisting criteria of dissolved oxygen, water clarity, and chlorophyll-a, are the result of nitrogen, phosphorous, and sediment inputs from all contributing waters, 2) There is both a desire and need to demonstrate effectiveness at some spatial and temporal scale, and 3) The emphasis on water quality does not imply that we lose sight of the restoration of living resources as the overarching goal of the partnership.

What does this focus on delisting and management actions imply? The Senior Managers recognize the following:

- Meeting the delisting criteria of dissolved oxygen, clarity, and chlorophyll-a in the tidal segments of the Bay means meeting the acceptable loads of nitrogen, phosphorous, and sediment from all contributing waters in the watershed
- Significant implementation, and demonstration of effectiveness, probably occurs at the scale of a small watershed (approximately 50 to 150 square miles). Monitoring activities should provide information at this scale.
- Monitoring should provide information to support spatially explicit delisting decisions, and report early signals of improvement and progress towards interim milestones prior to delisting.
- Assessing the effectiveness of management actions to reduce loads in the watershed is critical.
- Monitoring should communicate information that is relevant to the public and where they live in the watershed.

As one Senior Manager put it, "Monitoring is an assessment of how well you are achieving your goals and supports decisions on how effective your efforts have been and whether changes in how you are implementing actions are needed to better achieve your goals".

Examination of Necessary Monitoring Elements to Inform Priority Endpoints

We asked monitoring program managers and technical experts to describe for us what monitoring design parameters would make us capable of demonstrating that we are making a difference in delisting the Bay (where, when, how), and if there are additional monitoring elements needed to implement adaptive management. In other words, what would we need to monitor to support spatially explicit delisting decisions? To give us early signals of trajectories? To evaluate effectiveness of management actions? Once the "perfect" monitoring program was specified, we could then begin to map what is

currently in-place, where the gaps are, and the consequences of various re-alignment scenarios.

An important early conclusion of this effort is the following: **it is, indeed, possible to obtain the type of information necessary to answer the management endpoints**. However, even with the focused objective stated above, the "perfect" monitoring that would be necessary to fully address it was voluminous, and beyond the scope of what the partnership can currently support. The second conclusion was thus the following: **some balancing between monitoring directed to address the delisting question and assessing the effectiveness of management actions is necessary (i.e., it is a zero-sum need)**. Various tradeoffs will need to be evaluated. For example, some tidal Bay monitoring could be relaxed to allow some documentation of early successes in the upper portions of the watershed.

The monitoring program managers immediately identified a few critical gaps to answering the posed questions: 1) Discharge and flow monitoring stations are crucial to a number of monitoring assessments, and are not well-represented at the scale of smaller watersheds and streams, 2) Sentinel sites for Best Management Practices (BMPs) are almost non-existent, and 3) Of 200 sites identified in the non-tidal network, only 90 or so have been implemented. They also provided a number of ideas to guide any necessary re-alignment of the monitoring program:

- Monitoring and modeling must be effectively integrated.
- The role of the CBP as a data repository and analysis center needs to be established. Data is of little value if it cannot be easily accessed, and then analyzed in a meaningful fashion.
- Focusing on segments "close" to delisting implies a spatially explicit approach to monitoring.
- The role of automated monitoring should constantly be examined to look for potential efficiencies.
- The suitability of data from a broad array of outside sources (e.g., wastewater treatment plants, watershed groups) should be assessed.

Process for Disinvesting/Reinvesting

The process of prioritizing is fairly simple, as is the recognition of a gap between your priorities and current practice. The difficult step is the process of reconciling what you desire and what you do. In order to provide the singularity of purpose necessary for these difficult decisions, we asked the Watershed Partner Senior Managers to confirm the mission that they had constructed. The original mission was strongly confirmed: **the delisting of the tidal segments of the Bay and determining the effectiveness of our management actions are the responsibilities of the partnership, and should be the priorities of the monitoring program**.

We then asked them to devise a simple series of questions, or decision rules, that could serve to guide disinvesting/reinvesting decisions. These decision rules should be general enough to be utilized in a repeating and periodic assessment of the monitoring program.

In other words, **this initial monitoring review is the beginning of a process, not the end.** The decision rules are as follows:

1. Identify portions of the monitoring picture that are "sacred" (base commitment),
2. Identify which portions are flexible (potential dis-investing),
3. Identify priorities for addition (re-investing).

Because the decision rules are developed in this collaborative setting, they provide both a clear basis for the difficult element-specific decision-making that follows, and confidence that these finer scale decisions are consistent with the monitoring program mission developed through the workshops. The following paragraphs briefly detail each of these steps.

The sacred elements in this first monitoring review were identified by the Senior Managers as: 1) the minimum amount of information necessary for de-listing, 2) data that is critical in the historical and long-term scientific characterization of the Bay, and 3) data that is utilized in formalized and important communication to the public (e.g., Health and Restoration Assessment). Once these elements are identified, the next step is the specification of the minimum amount of monitoring information needed to address each.

Once the minimum is identified, monitoring that is outside of this circle is deemed flexible. The obvious next step is then the identification of priorities. The priorities developed by the Senior Managers are those which provide data to support adaptive management: 1) What are the effectiveness of management actions, most specifically those implemented in the upper portions of the watershed, 2) Where can we demonstrate early signals of trajectories, and 3) If we can't demonstrate success, how do we determine the reasons for failure.

The Senior Managers provided two important notes on these decision rules. Firstly, the decision rules may be applied at a number of scales and points in the review process. In other words, the can be used to apply a hatchet, then a scalpel, to monitoring program elements. Secondly, the monitoring review process must be applied frequently enough to address important emerging issues (e.g., climate change), recognize changing costs and efficiencies (e.g., incorporation of new technologies), attain goals (making portions of the monitoring program unnecessary), adapt to the changing needs of management, and prevent the dramatic excursion of the monitoring program from the objectives of the partnership. It is initially recommended to repeat the monitoring review in two to three years.

Conclusions

The conclusions arrived at during this first iteration of the process are as follows:

- Continuing operation of the monitoring effort in a status quo condition is unacceptable.
- The delisting of the tidal segments of the Bay and determining the effectiveness of our management actions are the responsibilities of the partnership, and should be the priorities of the monitoring program.
- It is possible to obtain the type of information necessary to answer the management endpoints.

- Some balancing between monitoring directed to address the delisting question and assessing the effectiveness of management actions is necessary (i.e., it is a zero-sum game)
- This initial monitoring review is the beginning of a process, not the end.

Appendix A
STAC Publications with Emphasis on Monitoring

1. STAC (2007) Submerged Aquatic Vegetation Reproductive Ecology: Evaluating the State of Knowledge and Assessing Future Research Needs.
2. STAC (2007) Developing Environmental Indicators for Assessing the Health of the Chesapeake Bay Watershed
3. CRC-NCBO (2006) Baywide and Coordinated Chesapeake Fish Stock Monitoring
4. STAC (2005) Evaluating the Design and Implementation of the Chesapeake Bay Shallow Water Monitoring Program
5. STAC (2005): Assessing Progress and Effectiveness through Monitoring Rivers and Streams: Report of the Task Force on Analysis of Non-tidal Water Quality Modeling Results
6. STAC (2005) Recommendations for Refinement of a Spatially Representative Non-tidal Water Quality Monitoring Network for the Chesapeake Bay Watershed
7. Maryland Sea Grant (2004) Estuarine and Watershed Monitoring Using Remote Sensing Technology: Present Status and Future Trends Workshop
8. STAC (2004) Scientific and Technical Needs for Fulfilling Chesapeake 2000 Goals: 2004 Update
9. STAC (2000) The Technical Review of the CBPs Basin-wide Monitoring Program
10. STAC (1997) Watershed Response to Changes in Nutrient Loads: The Best Uses of Modeling and Monitoring
11. STAC (1996) Integrated Analysis of Chesapeake Bay Monitoring Data

Appendix B
Process for the Technical Review of the Chesapeake Bay Program's Monitoring Program

STAC Task: Develop a process to approach disinvesting and re-investing under adaptive monitoring for adaptive management; STAC asked to conduct a review of the monitoring program.

1. Provide an assessment of how well the current package of Bay Program funded monitoring programs supports Bay Program objectives.

   Compare Goals outlined by management authorities to existing Bay Program funded monitoring programs.
   Do the existing monitoring programs collect information to assess attainment of goals?

2. Provide recommendations that will enable more efficient use of scarce resources and improved ecological assessments in support of Bay Program objectives. These recommendations should address:
   - Opportunities to better coordinate Bay Program and non-Bay Program funded monitoring programs,
   - Potential applications of specific new technologies and techniques, and
   - Possible reallocations of resources among the current monitoring programs.

   Recruit a professional facilitator to help shepherd the process.

   Convene Senior Managers (Cabinet-level, Agency & Department heads); Managers invested with the authority to establish policy and direct or reallocate funding.
   Engage managers in discussion of management endpoints and limited resources (see List 1).
   Conduct pre-meeting telephone interviews with managers to prepare them for the joint meeting.
   What are the priority goals or management endpoints? For example, when you sit at the table with your Governor, what is the Governor asking about in regard to goals? What are the governors' and administrators' priorities?
   Note: It is important to convene upper level management to avoid possible irrational exuberance of monitoring program personnel defending the status quo.

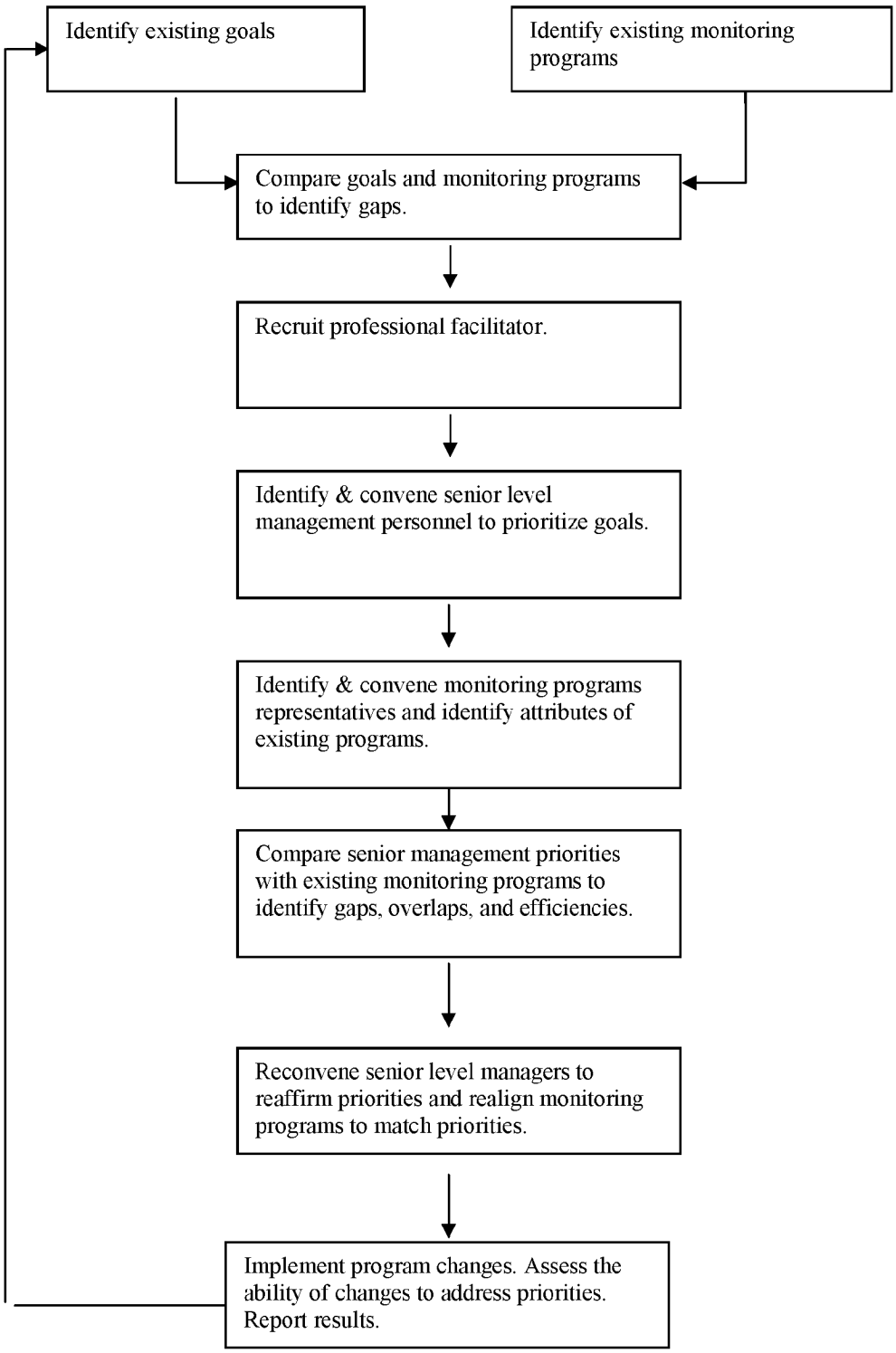
3. Explain implications, pro and con, of recommended changes.

   Convene monitoring program personnel, scientists, and external expertise to review existing monitoring programs and evaluate monitoring needs. Identify gaps and spatial/temporal limitations of data (see List 2).

4. Prioritize recommended changes.

Reconvene Senior Managers to reaffirm goals/priorities.

Outline existing monitoring programs and align with senior manager priorities for coordinated monitoring for strategic objectives. Provide recommendations regarding realignment of focus/funding of monitoring programs to meet Senior Managers priorities. Lead managers in discussion of which programs meet goal priorities, which programs are sacred or untouchable whether they meet goal priorities or not, and which programs are flexible or do not contribute to meeting management priorities.
Note: Programs that are deemed flexible or do not contribute to the immediate goal priorities and are modified or eliminated may become reinstated in the future as management goal priorities change.


Identify existing goals
Identify existing monitoring programs
Compare goals and monitoring programs to identify gaps.
Recruit professional facilitator.
Identify & convene senior level management personnel to prioritize goals.
Identify & convene monitoring programs representatives and identify attributes of existing programs.
Compare senior management priorities with existing monitoring programs to identify gaps, overlaps, and efficiencies.
Reconvene senior level managers to reaffirm priorities and realign monitoring programs to match priorities.
Implement program changes. Assess the ability of changes to address priorities. Report results.

List 1. Senior Manager Participants

Russ Baxter	Deputy Director, VA Department of Conservation and Recreation
Bill Brannon	Deputy Director, WV Department of Environmental Protection
Pat Buckley	CBP Coordinator, PA Department of Environmental Protection
Jeff Corbin	Assistant Secretary, VA Office of the Secretary of Natural Resources
Frank Dawson	Assistant Secretary, Maryland Department of Natural Resources
Rich Eskin	Director, MD Department of the Environment
John Hines	Director, PA Department of Environmental Protection
Joe Hoffman	Executive Director, Interstate Commission on the Potomac River Basin
Jennifer Hoffman	Section Chief, Susquehanna River Basin Commission
Jeff Lape	Director, EPA Chesapeake Bay Program
Scott Phillips	US Geological Survey Chesapeake Bay Coordinator
Alan Pollock	Manager, VA Department of Environmental Quality
Peyton Robertson	Director, NOAA Chesapeake Bay Office
Dave Russ	Regional Executive, NE US Geological Survey
John Schneider	Manager, DE Dept of Natural Resources & Env. Control
Ann Swanson	Director, Chesapeake Bay Commission
Matt Mullin	Chesapeake Bay Commission

List 2. Monitoring program personnel, scientists, and external experts.

Joseph Bachman	Environmental Protection Agency Headquarters
Steve Bieber	Metropolitan Washington Council of Governments
Claire Buchanan	Interstate Commission on the Potomac River Basin
Denise Breitburg	University of Maryland Center for Environmental Science
Robert Brooks	Pennsylvania State University
Majorie Friedrichs	Virginia Institute of Marine Science, Biological Sciences
Dean Hively	USDA Agricultural Research Service
Jennifer Hoffman	Section Chief, Susquehanna River Basin Commission
Rick Hoffman	Virginia Department of Environmental Quality
Lewis Linker	Modeling Coordinator, Chesapeake Bay Program Office
Ben Longstaff	NOAA- UMCES
Bruce Michael	Maryland Department of Natural Resources
Margie Mulholland	Old Dominion University
Scott Phillips	US Geological Survey Chesapeake Bay Coordinator
John Randolph	Virginia Tech
Kristen Saacke-Blunk	Pennsylvania State University
John Schneider	Delaware Depart. Natural Resources & Environmental Control
Kevin Sellner	Chesapeake Research Consortium
Tony Shaw	Pennsylvania Department of Environmental Protection
Jian Shen	Virginia Institute of Marine Science, Physical Sciences
Rick Shertzer	PA Department of Environmental Protection
Doreen Vetter	EPA Chesapeake Bay Program Office
Lisa Wainger	University of Maryland Center for Environmental Science
Don Weller	Smithsonian Estuarine Research Center
John Wirts	West Virginia Depart. of Environmental Protection